

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellants: Surdeanu et al.

Group Art Unit: 2811

Serial No.: 10/597,996

Examiner: Tran, Trang Q.

Filed: August 15, 2006

Confirmation No.: 8935

For: SEMICONDUCTOR DEVICE AND METHOD OF MANUFACTURING A  
SEMICONDUCTOR DEVICE

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APPEAL BRIEF UNDER 37 C.F.R. § 41.37(a)

This is an appeal to the Board of Patent Appeals and Interferences from the decision of the Examiner dated June 21, 2011, which finally rejected claims 1-3, 5-10, 12 and 14-21 in the above-identified application. A Notice of Appeal was filed on October 15, 2011. This Appeal Brief is hereby submitted pursuant to 37 C.F.R. § 41.37(a).

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## **I. REAL PARTY IN INTEREST**

The real party in interest in this appeal is NXP B.V., High Tech Campus 60, 5656 AG Eindhoven, The Netherlands.

## **II. RELATED APPEALS AND INTERFERENCES**

To the best of Appellants' knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.

## **III. STATUS OF CLAIMS**

Claims 1-13 were originally filed on August 15, 2006. In response to the Requirement for Restriction/Election of August 28, 2008, claims 1-8 were elected and claims 9-13 were canceled. In response to the Office Action of December 15, 2008, claims 1 and 2 were amended and new claims 9-12 were added. Appellants note that new claims 9-12 should have been numbered claims 13-16. In response to the Final Office Action of July 21, 2009, claims 1 and 5 were amended and claim 4 was canceled. In response to the Office Action of January 5, 2010, new claims 13-21 were added. In response to the Final Office Action of June 4, 2010, claims 1 and 14 were amended and claims 11 and 13 were canceled. Claims 1-3, 5-10, 12 and 14-21 stand finally rejected and form the subject matter of the present appeal.

Claims 1-3, 5-10, 12 and 14-21 stand rejected as follows:

Claims 1-3, 5-10, 12, 14-16 and 18-21 stand rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over En et al. (U.S. Pat. No. 6,441,433, hereinafter "En") in view of Krivokapic (U.S. Pat. No. 6,888,198).

Claim 17 stands rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over En in view of Krivokapic, and further in view of Pellerin et al. (WO 02/075781 A2, hereinafter "Pellerin").

A copy of the claims is set forth in the Claims Appendix.

## **IV. STATUS OF AMENDMENTS**

No amendments were filed subsequent to the final rejection.

## **V. SUMMARY OF CLAIMED SUBJECT MATTER**

This section of this Appeal Brief is set forth to comply with the requirements of 37 C.F.R. § 41.37(c)(1)(v) and is not intended to limit the scope of the claims in any way. Examples of implementations of the limitations of independent claim 1 are described below.

The language of claim 1 relates to a semiconductor device (105, 205) comprising a silicon-containing semiconductor body (110, 210) with a surface (126, 226). (Page 1, lines 1-6; Figs. 2-13). The semiconductor body (110, 210) is provided, near the surface (126, 226) thereof, with a transistor comprising: a gate (170, 270) situated at the surface (126, 226) and having a side wall spacer (136, 138, 236) on either side of the gate, and further comprising, on either side of the gate (170, 270), a diffusion region (180, 182, 280) formed in the semiconductor body (110, 210), at least one diffusion region (180, 182, 280) being provided at the surface (126, 226) of the semiconductor body (110, 210) with a silicide region (190, 192), characterized in that the silicide region (190, 192) extends along the surface (126, 226) of the semiconductor body (110, 210) and continues for more than 10 nm under the side wall spacer (136, 138, 236). (Page 1, lines 1-6 and page 2, lines 9-13; Figs. 2-13). The side wall spacer (136, 138, 236) is L-shaped and comprises a first portion, which borders on the gate and extends substantially perpendicularly with respect to the surface of the semiconductor body, and a second portion which extends along the surface of the semiconductor body. (Page 2, lines 22-27; Figs. 2 and 6-13). The silicide region (190, 192) is completely below the side wall spacer (136, 138, 236), the side wall spacer (136, 138, 236) is configured to directly contact the entire surface of a side of the gate (170, 270) and the side wall spacer (136, 138, 236) is made of one material. (Page 5, line 33-page 6, line 26 and page 10, line 4-page 11, line 26; Figs. 2 and 6-13).

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

- A. Whether or not independent claim 1 is unpatentable over En in view of Krivokapic under 35 U.S.C. 103(a).

- B. Whether or not dependent claims 2, 3, 5-10, 12 and 14-21 are unpatentable over En in view of Krivokapic under 35 U.S.C. 103(a) or unpatentable over En in view of Krivokapic, and further in view of Pellerin under 35 U.S.C. 103(a).

## VII. ARGUMENT

- A. Appellants respectfully assert that independent claim 1 is patentable over En in view of Krivokapic under 35 U.S.C. 103(a).

Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1. Specifically, Appellants respectfully submit that the alleged reasoning provided by the Examiner to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, the teachings of En in view of Krivokapic are not sufficient to establish a *prima facie* case of obviousness with respect to claim 1.

In order to establish a *prima facie* rejection of a claim under 35 U.S.C. 103, the Office Action must present a clear articulation of the reason why the claimed invention would have been obvious. MPEP 2142 (citing *KSR International Co. v. Teleflex Inc.*, 550 U.S. (2007)). The analysis must be made explicit. Id. Additionally, rejections based on obviousness cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. Id.

MPEP §2142 states:

“The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness” (emphasis added).

The Examiner admits in the Final Office Action of June 21, 2011 that En does not teach the limitation “*the silicide region extends along the surface of the semiconductor body and continues for more than 10 nm under the side wall spacer*” (emphasis added) and the limitation “*the side wall spacer is L-shaped*” (emphasis added), as recited in

claim 1. (See page 3 of the Final Office Action). The Examiner further states in the Final Office Action of June 21, 2011:

"Fig. 1 of Krivokapic teaches it is known in the art to provide a side wall spacer (48) is L-shaped.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the silicide region continues for more than 10 nm under the side wall spacer and the L-shape of the side wall, as taught by Krivokapic in En, in order to reduce resistance and to protect the gate.

Furthermore, it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ 2d 1685, 1688 (Fed. Cir. 1996).

Furthermore, the shape of the side wall spacer was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant. See *In re Dailey*, 357 F. 2d 669, 149 USPQ 47 (CCPA 1966)." (See page 3 of the Final Office Action).

However, Appellants respectfully assert that the Examiner's assertion "it is known in the art to provide a side wall spacer (48) is L-shaped" is not supported by fact and thus is not based on a rational underpinning.

With regard to the Examiner's assertion "it is known in the art to provide a side wall spacer (48) is L-shaped" (emphasis added), Appellants respectfully assert that the nitride layer (48) of Krivokapic is not an L-shaped side wall spacer.

Specifically, Krivokapic teaches that the nitride layer (48) is formed on an oxide layer (46) as well as the sidewalls of a gate electrode (36) and that the nitride layer (48) may be made of silicon nitride, silicon oxynitride, or the like. (See Fig. 1 and column 4, lines 5-10). In addition, Krivokapic teaches that spacers (50) extend upward from the upper surface (52) of the nitride layer (48) and cover the sidewalls of the nitride layer (48). (See Fig. 1 and column 4, lines 11-15). That is, Krivokapic teaches that spacers (50) are formed adjacent to the nitride layer (48).

Because Krivokapic teaches that spacers (50) are formed adjacent to the nitride layer (48), the nitride layer (48) of Krivokapic is not a spacer. Thus, Appellants respectfully assert that the nitride layer (48) of Krivokapic is not an L-shaped side wall spacer. Because the Examiner relies on the nitride layer (48) of Krivokapic to support the assertion "it is known in the art to provide a side wall spacer (48) is L-shaped" and the nitride layer (48) of Krivokapic is not an L-shaped side wall spacer, Appellants

respectfully assert that the above-identified assertion of the Examiner is not supported by fact and thus is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

In addition, Appellants respectfully assert that the Examiner's assertion "the shape of the side wall spacer was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant" is not based on a rational underpinning because there is persuasive evidence in Appellants' specification that the L-shape of the side wall spacer is significant.

With regard to the Examiner's assertion "the shape of the side wall spacer was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant" (emphasis added), Appellants respectfully submit that there is persuasive evidence in Appellants' specification that the L-shape of the side wall spacer is significant.

For example, Appellants' specification describes that the L-shaped side wall spacer has the advantage that the dimensions of the amorphous region can be controlled so that the extension of the amorphous region under the side wall spacer is provided in a controlled manner and that as a result, the silicide region is formed over a longer distance under the side wall spacers. (See Appellants' specification at Fig. 11, page 2, lines 26 and 27, page 4, lines 12-14, page 10, lines 20-26, and page 11, lines 20-22.) In addition, Appellants' specification describes that another advantage of the L-shaped side wall spacer resides in that, no matter what the implantation angle is, the interface (515) between an amorphous silicon and a crystalline silicon runs substantially parallel to a surface (126) of a substrate (150). (See Appellants' specification at page 11, lines 20-26.) Furthermore, Appellants' specification describes that in the case of L-shaped side wall spacers, it is possible to fill the side wall spacers with nitride, which made the application of other layers (for example oxide layers) on top of the semiconductor device easier. (See Appellants' specification at page 13, lines 6-10.)

Because of the above-identified advantages of the L-shape of the side wall spacer, Appellants respectfully submit that there is **persuasive evidence** in Appellants' specification that the L-shape of the side wall spacer is significant. Because there is persuasive evidence in Appellants' specification that the L-shape of the side wall spacer is significant, the change in the shape of the side wall spacers is not a matter of obvious choice. Thus, the Examiner's reasoning to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

Furthermore, Appellants respectfully assert that the Examiner's assertion "it has been held that discovering the optimum or workable ranges involves only routine skill in the art" is not based on a rational underpinning.

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See MPEP 2144.05(II)(B).

In the case at hand, there is no mention in En that the distance of the silicide regions (48/54) under the spacers (58) is a result-effective variable. Since the distance of the silicide regions (48/54) under the spacers (58) is not recognized as a result-effective variable in En, the claimed distance cannot be characterized as routine experimentation. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

Lastly, Appellants respectfully assert that the Examiner's assertion "[i]t would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the silicide region continues for more than 10 nm under the side wall spacer and the L-shape of the side wall, as taught by Krivokapic in En, in order to reduce resistance and to protect the gate" is a mere conclusory statement.

The Examiner merely provides a conclusory statement to support the asserted conclusion of obviousness. Specifically, the Examiner does not articulate how the

teachings of Krivokapic and En would be combined to “reduce resistance and to protect the gate” (emphasis added), as alleged in the Final Office Action. In addition, the Examiner does not articulate why the combination of the teachings of Krivokapic and En would “reduce resistance and to protect the gate” (emphasis added), as alleged in the Final Office Action. Thus, the Examiner’s reasoning to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

In addition, the Examiner states in the section titled “Response to Arguments” of the Final Office Action of June 21, 2011:

“Applicant’s arguments, see pg. 3, with respect to the rejection that En et al. do not teach the limitation ‘the side wall spacer is L-shaped’

Applicant does not claim the material of the spacer. For the broadest interpretation, the spacer can be (arbitrarily chosen) any layer adjacent or on the sidewall of the gate electrode. Therefore, En et al. in view of the Krivokapic et al. disclose the side wall spacer is L-shape.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the spacer has L-shape in En et al., order to achieve the device properties.

Furthermore, the change in shape of the shape of the spacer was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant. See *In re Dailey*, 357 F. 2d 669, 149 USPQ 47 (CCPA 1966).

According to M.P.E.P. § 2144.04(IV)(B), the court held that the configuration of the claimed disposable plastic nursing container was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant. See *In re Dailey*, 357 F. 2d 669, 149 USPQ 47 (CCPA 1966).

In Dailey, the court stated that “[a]ppellant have present no argument which convinces us that the particular configuration of their container is significant or is anything more than one of numerous configurations a person of ordinary skill in the art would find obvious” (357 F. 2d 669, 149 USPQ at 50 ).

In the instant case, Applicant is claiming towards the spacer where the shaper is manipulated. Prior art teaches the spacer, wherein they are similar, but only the shape is different. Therefore, it is unpatentable by a mere change in shape for which one of ordinary skill in the art would have found obvious.

In response to applicant’s argument that the references fail to show certain features of applicant’s invention, it is noted that the features upon which applicant relies (i.e., the size, shape and layout of the protrusions) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).” (emphasis added). (See the

section titled “Response to Arguments” on pages 11 and 12 of the Final Office Action).

Appellants respectfully assert that the above-identified assertions of the Examiner are merely conclusory statements that are not based on a rational underpinning, as described below.

Appellants respectfully assert that the Examiner’s assertion “[f]or the broadest interpretation, the spacer can be (arbitrarily chosen) any layer adjacent or on the sidewall of the gate electrode” is not supported by fact and thus is not based on a rational underpinning.

With respect to the Examiner’s assertion “[f]or the broadest interpretation, the spacer can be (arbitrarily chosen) any layer adjacent or on the sidewall of the gate electrode,” Appellants respectfully assert that none of the cited references of En, Krivokapic and Pellerin teaches that a side wall spacer can be arbitrarily chosen to be any layer adjacent or on a sidewall of a gate electrode. In addition, Appellants respectfully note that the Examiner also does not provide any other factual support for the above-identified assertion. Thus, Appellants respectfully assert that the above-identified assertion of the Examiner is not supported by fact and thus is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

In addition, Appellants respectfully assert that the Examiner’s assertion “[t]he L-shape would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the spacer has L-shape in En et al., order to achieve the device properties” is a mere conclusory statement.

The Examiner merely provides a conclusory statement to support the asserted conclusion of obviousness. Specifically, the Examiner does not describe what properties are being optimized. In addition, the Examiner does not describe how the teachings of En and Krivokapic would be combined to “achieve the device properties” (emphasis added), as alleged in the Final Office Action. Furthermore, the Examiner does not describe why the combination of the teachings of En and Krivokapic would “achieve the

device properties" (emphasis added), as alleged in the Final Office Action. Thus, the alleged reasoning provided by the Examiner to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

Furthermore, Appellants respectfully assert that the Examiner's assertion "the change in [the shape of the spacer] was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant" is not based on a rational underpinning because there is persuasive evidence in Appellants' specification that the L-shape of the side wall spacer is significant.

The Examiner asserts that "the change in [the shape of the spacer] was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the side wall spacer was significant" (emphasis added). The Examiner also asserts that "[p]rior art teaches the spacer, wherein they are similar, but only the shape is different and that "it is unpatentable by a mere change in shape for which one of ordinary skill in the art would have found obvious." However, Appellants respectfully submit that there is persuasive evidence in Appellants' specification that the L-shape of the side wall spacer is significant, as described above. Because there is persuasive evidence in Appellants' specification that the L-shape of the side wall spacer is significant, the change in the shape of the side wall spacers is not a matter of obvious choice. Thus, the alleged reasoning provided by the Examiner to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1.

In addition, Appellants note that the Examiner merely concludes that "[t]he claimed invention is not patentable over the applied art for the reasons in final rejection" in the Advisory Action notified on August 19, 2011. This conclusory statement in the Advisory Action of August 19, 2011 does not cure the deficiency of the Final Office Action of June 21, 2011. Accordingly, the alleged reasoning provided by the Examiner

to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 1. As a result, Appellants respectfully submit that claim 1 is patentable over En in view of Krivokapic.

B. Appellants respectfully assert that dependent claims 2, 3, 5-10, 12 and 14-21 are patentable over En in view of Krivokapic under 35 U.S.C. 103(a) or patentable over En in view of Krivokapic, and further in view of Pellerin under 35 U.S.C. 103(a).

Given that dependent claims 2, 3, 5-10, 12 and 14-21 depend from and incorporate all of the limitations of the corresponding independent claim 1, Appellants respectfully submits that claims 2, 3, 5-10, 12 and 14-21 are allowable at least based on an allowable claim 1. Additionally, each of claims 2, 3, 5-10, 12 and 14-21 may be allowable for further reasons. In particular, claims 5, 7, 8, 12, 19 and 20 are allowable for reasons presented below.

#### Dependent Claims 5, 19 and 20

Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claims 5, 19 and 20. Specifically, Appellants respectfully submit that the Examiner's reasoning to support the asserted conclusion of obviousness is not based on a rational underpinning.

Claims 5 and 20 recite in part that "*the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm*" (emphasis added). Claim 19 recites in part that "*the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of 5 to 20 nm*" (emphasis added). The Examiner in the Final Office Action of June 21, 2011 admits that En and Krivokapic do not teach the above-identified limitations of claims 5, 19 and 20. (See pages 4, 5, 7 and 8 of the Final Office Action). The Examiner concludes that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to the second portion of the L-shaped side wall spacer has a thickness,

measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm, in order to optimize the performance of the device” (emphasis added). (See pages 4 and 8 of the Final Office Action). The Examiner also asserts that “it has been held that discovering the optimum or workable ranges involves only routine skill in the art.” (See pages 4 and 8 of the Final Office Action).

Appellants respectfully assert that the Examiner merely provides a conclusory statement to support the asserted conclusion of obviousness.

Specifically, the Examiner does not describe what performance is being optimized. In addition, the Examiner does not describe how the teachings of En and Krivokapic would be combined to “optimize the performance of the device” (emphasis added), as alleged in the Final Office Action. Furthermore, the Examiner does not describe why the combination of the teachings of En and Krivokapic would “optimize the performance of the device” (emphasis added), as alleged in the Final Office Action. Thus, the reasoning provided by the Examiner to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claims 5, 19 and 20.

In addition, Appellants respectfully assert that the Examiner’s assertion “it has been held that discovering the optimum or workable ranges involves only routine skill in the art” is not based on a rational underpinning.

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See MPEP 2144.05(II)(B).

In the case at hand, there is no mention in En that the thickness of a portion of the spacers (58) is a result-effective variable. Since the thickness of a portion of the spacers (58) is not recognized as a result-effective variable in En, the claimed distance cannot be characterized as routine experimentation. As a result, Appellants respectfully assert that

a *prima facie* case of obviousness has not been established with respect to claims 5, 19 and 20.

Furthermore, Appellants respectfully assert that the thickness of the second portion of the L-shaped side wall spacer “of maximally 40 nm” (emphasis added) as recited in claims 5 and 20 and “of 5 to 20 nm” (emphasis added) as recited in claim 19 is critical and achieves unexpected results.

MPEP 2144.05 states:

Appellants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

For example, Appellants' specification at Fig. 11 and page 11, lines 6-8, describes that, compared to an L-shaped sidewall spacer with a second portion, which extends along a surface of a semiconductor body, that has a thickness of more than 40nm, an L-shaped sidewall spacer with a second portion that has a thickness of maximally 40 nm prevents an effect of an amorphization implantation from getting too low and results in an improved operation of a semiconductor device. Thus, the claimed dimension is critical and achieves unexpected results. As a result, Appellants respectfully assert that the teachings of En and Krivokapic are not sufficient to establish a *prima facie* case of obviousness with respect to claims 5, 19 and 20.

Lastly, Appellants respectfully assert that a semiconductor device having the claimed relative dimensions performs differently than a device without the claimed relative dimensions.

MPEP § 2144.04(IV)(A) states:

In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. (emphasis added)

For example, Appellants' specification at Fig. 11 and page 11, lines 6-8, describes that, compared to an L-shaped sidewall spacer with a second portion, which extends along a surface of a semiconductor body, that has a thickness of more than 40nm, an L-shaped sidewall spacer with a second portion that has a thickness of maximally 40 nm prevents an effect of an amorphization implantation from getting too low and results in an improved operation of a semiconductor device. Thus, a semiconductor device having the claimed dimensions performs differently than a device without the claimed relative dimensions.

In addition, Appellants note that the Examiner merely concludes that "[t]he claimed invention is not patentable over the applied art for the reasons in final rejection" in the Advisory Action notified on August 19, 2011. This conclusory statement in the Advisory Action of August 19, 2011 does not cure the deficiency of the Final Office Action of June 21, 2011. Accordingly, the alleged reasoning provided by the Examiner to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Appellants respectfully assert that the teachings of En and Krivokapic are not sufficient to establish a *prima facie* case of obviousness with respect to claims 5, 19 and 20. Thus, claims 5, 19 and 20 are patentable over En in view of Krivokapic.

#### Dependent Claims 7 and 8

Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claims 7 and 8. Claim 7 recites in part that "*the semiconductor body comprises a germanium component.*" Claim 8 recites in part that "*the semiconductor body comprises a strained-silicon layer.*" The Examiner in the Final Office Action of June 21, 2011 admits that En and Krivokapic do not teach the above-identified limitations of claims 7 and 8. (See page 5 of the Final Office Action). However, the Examiner concludes that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the semiconductor body comprises a germanium component or strained-silicon layer of Krivokapic in En, in order to improve the performance of the device" (emphasis added). (See pages 4 and 8 of the Final Office Action).

However, the Examiner merely provides a vague conclusory statement to support the asserted conclusion of obviousness. Specifically, the Examiner does not describe what performance is being optimized. In addition, the Examiner does not describe how the teachings of En and Krivokapic would be combined to “improve the performance of the device” (emphasis added), as asserted in the Final Office Action. Furthermore, the Examiner does not describe why the combination of the teachings of En and Krivokapic would “improve the performance of the device” (emphasis added), as asserted by the Final Office Action. In addition, Appellants note that the Examiner merely concludes that “[t]he claimed invention is not patentable over the applied art for the reasons in final rejection” in the Advisory Action notified on August 19, 2011. This conclusory statement in the Advisory Action of August 19, 2011 does not cure the deficiency of the Final Office Action of June 21, 2011. Accordingly, the reasoning provided by the Examiner to support the asserted conclusion of obviousness is not based on a rational underpinning. As a result, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claims 7 and 8. Thus, claims 7 and 8 are patentable over En in view of Krivokapic.

#### Dependent Claim 12

Claim 12 was rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over En in view of Krivokapic. However, Appellants respectfully note that the Examiner relies on Yang to teach the limitation “*the metal is palladium (Pd)*” of claim 12. (See page 6 of the Final Office Action). Because Yang was relied on to reject claim 12 and Yang was not cited by the Examiner in the rejection of claim 12, Appellants respectfully assert that a *prima facie* case of obviousness has not been established with respect to claim 12. Thus, claim 12 is patentable over En in view of Krivokapic.

### VIII. CONCLUSION

A *prima facie* case of obviousness has not been established with respect to independent claim 1. Thus, independent claim 1 is not obvious over En in view of Krivokapic under 35 U.S.C. 103(a). In addition, dependent claims 2, 3, 5-10, 12 and 14-21 are allowable at least based on allowable claim 1 since claims 2, 3, 5-10, 12 and 14-21

depend from and incorporate all of the limitations of the corresponding independent claim 1.

For the reasons stated above, claims 1-3, 5-10, 12 and 14-21 are patentable over the cited references. Appellants respectfully request that the Board reverse the rejections of claims 1-3, 5-10, 12 and 14-21.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-4019** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-4019** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

Date: December 14, 2011

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## IX. CLAIMS APPENDIX

1. A semiconductor device comprising a silicon-containing semiconductor body with a surface, which semiconductor body is provided, near the surface thereof, with a transistor comprising: a gate situated at the surface and having a side wall spacer on either side of the gate, and further comprising, on either side of the gate, a diffusion region formed in the semiconductor body, at least one diffusion region being provided at the surface of the semiconductor body with a silicide region, characterized in that the silicide region extends along the surface of the semiconductor body and continues for more than 10 nm under the side wall spacer, wherein the side wall spacer is L-shaped and comprises a first portion, which borders on the gate and extends substantially perpendicularly with respect to the surface of the semiconductor body, and a second portion which extends along the surface of the semiconductor body, wherein the silicide region is completely below the side wall spacer, wherein the side wall spacer is configured to directly contact the entire surface of a side of the gate, and wherein the side wall spacer is made of one material.
2. A semiconductor device as claimed in claim 1, characterized in that the silicide region contains a metal which, in the silicide region formed, has a higher diffusion rate than silicon.
3. A semiconductor device as claimed in claim 2, characterized in that the metal is selected from the group comprising nickel (Ni), platinum (Pt) and palladium (Pd) and alloys of these metals.
5. A semiconductor device as claimed in claim 1, characterized in that the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm.
6. A semiconductor device as claimed in claim 1, characterized in that an insulating layer extends in the semiconductor body in a direction parallel to the surface of the semiconductor body.

7. A semiconductor device as claimed in claim 1, characterized in that the semiconductor body comprises a germanium component.
8. A semiconductor device as claimed in claim 1, characterized in that the semiconductor body comprises a strained-silicon layer.
9. A semiconductor device as claimed in claim 1, characterized in that the at least one diffusion region comprises the silicide region.
10. A semiconductor device as claimed in claim 1, characterized in that the at least one diffusion region comprises a diffusion region extension, the silicide region comprising a silicide region extension, the silicide region extension falling completely within the diffusion region extension.
12. A semiconductor device as claimed in claim 2, characterized in that the metal is palladium (Pd).
14. A semiconductor device as claimed in claim 1, wherein the side wall spacer is configured to contact the entire surface of the side of the gate without an intervening structure.
15. A semiconductor device as claimed in claim 1 further comprising an insulation layer that is located below the gate, wherein the side wall spacer is configured to directly contact the insulation layer.
16. A semiconductor device as claimed in claim 1 further comprising an insulation layer that is located below the gate, wherein the gate comprises a conductive layer and a silicide layer, and wherein the side wall spacer is configured to directly contact the insulation layer, the conductive layer and the silicide layer.

17. A semiconductor device as claimed in claim 1 further comprising an insulation layer that is located below the gate, wherein the gate comprises a metal conductive layer, and wherein the side wall spacer is configured to directly contact the insulation layer and the metal conductive layer.
18. A semiconductor device as claimed in claim 1 further comprising an insulation layer that is located below the gate, wherein the gate comprises a conductive layer that is made of polycrystalline silicon, and wherein the side wall spacer is configured to directly contact the insulation layer and the conductive layer.
19. A semiconductor device as claimed in claim 1, wherein the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of 5 to 20 nm.
20. A semiconductor device as claimed in claim 1, wherein the silicide region contains a metal which, in the silicide region formed, has a higher diffusion rate than silicon, and wherein the second portion of the L-shaped side wall spacer has a thickness, measured in a direction perpendicular to the surface of the semiconductor body, of maximally 40 nm.
21. A semiconductor device as claimed in claim 1, wherein the silicide region contains a metal which, in the silicide region formed, has a higher diffusion rate than silicon, and wherein an insulating layer extends in the semiconductor body in a direction parallel to the surface of the semiconductor body.

## **X. EVIDENCE APPENDIX**

There is no evidence submitted with this Appeal Brief.

## **XI. RELATED PROCEEDINGS APPENDIX**

To the best of Appellants' knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.